UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 1
5 Post Office Square
Boston, MA 02109-3912

March 3, 2017

Mark Wert
Massachusetts Department of Environmental Protection
One Winter Street, 7th floor
Boston, Massachusetts 02108

Dear Mr. Wert:

Thank you for the opportunity to review and comment on your draft exceptional event demonstration, shared with us on February 17, 2017, for the Ft. McMurray wildfire. The Massachusetts Department of Environmental Protection (MassDEP) is proposing the demonstration under the exceptional events rule at 40 CFR 50.14 to show that the elevated ozone concentrations recorded at Chicopee and Ware monitoring locations on May 25 and 26, 2016 were the result of high levels of ozone and ozone precursors being transported within the smoke plume to Massachusetts.

EPA Region 1 has reviewed MassDEP's draft demonstration and is providing comments to strengthen the discussion. You will find the Agency's comments in the enclosure.

If you have any questions regarding this matter, please contact Eric Wortman at 617-918-1624, or Catie Taylor at 617-918-8607.

Sincerely,

David B. Conroy, Chief
Air Programs Branch

Enclosure

cc: Steven Coughlin, MassDEP
Glenn Keith, MassDEP
Glenn Pacheco, MassDEP

Enclosure

EPA Comments on the Draft Exceptional Events Demonstration for the Ft. McMurray Wildfire Event in May 2016 Massachusetts Department of Environmental Protection

The Massachusetts Department of Environmental Protection (MassDEP) provided EPA a draft exceptional events demonstration on February 17, 2017 for air quality impacts from the 2016 Ft. McMurray wildfire. The draft submittal requests the exclusion of 8-hr ozone (O_3) monitoring data on May 25-26, 2016 for the Chicopee and Ware monitoring locations in western Massachusetts. The comments below are based on EPA's review of the draft submittal.

1. On Page 1, it is mentioned that "…ozone was monitored and recorded at 15 monitoring locations." We think it would be useful to mention that there is also an additional site operated by the Wampanoag Tribe on Martha's Vineyard, as shown on the map on page 7.

2. On Page 3, 4th paragraph, the term "AP-42" should be defined for the public.

3. On Page 5, MassDEP should consider adding two columns to Table 1 in Section 2 to indicate the critical 4th high value for 2017 to help demonstrate the regulatory significance of the exceptional event. For example, the calculations provided in the revised Table 1 below show that with the May 25-26 data excluded, the 4th high 8-hour ozone average in 2017 must stay below 72 parts per billion (ppb) at Chicopee compared with 67 ppb to stay in attainment of the 70 ppb NAAQS. This is a significant difference and part of the rationale for pursuing this exceptional events demonstration.

	Current Values					**If May 25-26 Removed**		
	2014	2015	2016	**2014-2016**	2017	2016	**2014-2016**	2017
	4th High	4th High	4th High	**Design Value**	Critical Value	4th High	**Design Value**	Critical Value
Chicopee	65	70	76	**70**	67	71	**68**	72
Ware	68	71	72	**70**	70	70	**69**	72

4. MassDEP should note the references for wildfire data in Section 6 of the document.

5. MassDEP should consider using time-lapse animation links to help illustrate the time sequence of smoke moving across the central / northeastern U.S. in Figure 2 in Section 6. Note that any use of animated technology should be able to be easily viewed by the public as

part of the public comment period and used to supplement the figures provided in the demonstration.

Additional satellite imagery during the transport event for the Great Lakes and Upper Midwest and subsequent movement to the east coast would also help provide the public and interested reviewers with a more complete picture of the movement of smoke from Fort McMurray to the affected monitors. Currently, the satellite still imagery cuts off in the western Great Lakes region. Satellite images of New England may show smoke was in the area on May 25-26.

Local webcams in the area may also provide supplemental information about whether or not smoke was found locally at ground level at either Chicopee, Ware, or other nearby locations on the dates considered for this exceptional events request. Ideally, this could provide corroborating information both during smoke filled, and clean days.

6. In Section 7, the conceptual model for ozone formation from the Fort McMurray wildfire should include a more robust discussion related to ozone production due to fire-related ozone precursors. The discussion should include the potential mechanisms for ozone production near and far from the fire (fresh emissions versus aged emissions) and information highlighting potential ozone production aloft and at ground level. The conceptual model should speak to areas of uncertainty as well as areas of scientific consensus. This discussion should help the public and other interested reviewers understand subsequent information presented further on in the demonstration's depiction of ground-level measurements typically associated with smoke.

7. In Section 7, it may be beneficial to include a discussion related to elevated ozone concentrations, meteorological conditions, and smoke conditions in the Upper Midwest/ Great Lakes Region and/or Upstate New York on the days preceding May 25-26, 2016.

8. In Section 7 on Page 12, the third paragraph reads, "The model forecasts under-predicted the observed levels by up to 10 ppb. This negative bias in the model is evidence of the influence of the smoke plume on ozone concentrations." It is important to note that Figures 4 and 5 seem to show the exact opposite effect in the southeast United States, particularly on May 19, 2016. The National Oceanic and Atmospheric Administration (NOAA) Community Multiscale Air Quality (CMAQ) model has over-predicted and under-predicted ambient ozone concentrations. Several potential explanations for this lack of predictability may be possible. MassDEP should consider providing data to support model performance from NOAA. MassDEP is encouraged to consider more broadly CMAQ model results in bolstering its argument that smoke alone was the cause of the model's under prediction of ozone.

9. If smoke from fires (Mexico/Yucatan, Georgia/South Carolina and/or Texas) other than the Fort McMurray fire (Figure 6, Page 17) are considered important in the narrative, then some

additional discussion related to fire-related smoke from these fires, their transport, and potential effects needs to be built into the narrative. As written, the contribution and significance of these additional fires is not described in this exceptional event request. It should either be better described or dropped from the demonstration narrative entirely.

10. MassDEP should provide additional information explaining Figure 10. Also, Figure 10 should be defined as Figure 10a, 10b, 10c, and 10d.

11. Pages 27 and 28. MassDEP should include additional figures similar to Figures 13 and 14 that include the data for entire ozone seasons for 2011-2016. Similar to Figures 13 and 14, MassDEP should provide the 99th percentile statistics on the additional figures. This will show if the concentrations recorded during May 25- 26, 2016 are unusual compared to the full ozone season over the last six years.

12. MassDEP should provide wind rose vs ozone concentrations plots for the Chicopee and Ware monitors for multiple years with explanation(s) regarding what the data means. This will illustrate the prominent wind direction during times of elevated ozone. The first two figures below (Figures 1 and 2) are wind roses from AirNow-Tech for calendar years 2012 through 2016. Figures 3 through 7 show the wind roses for the May through September time periods for 2012 through 2016, and allow the reader to better see the wind directions associated with moderate and higher air quality.

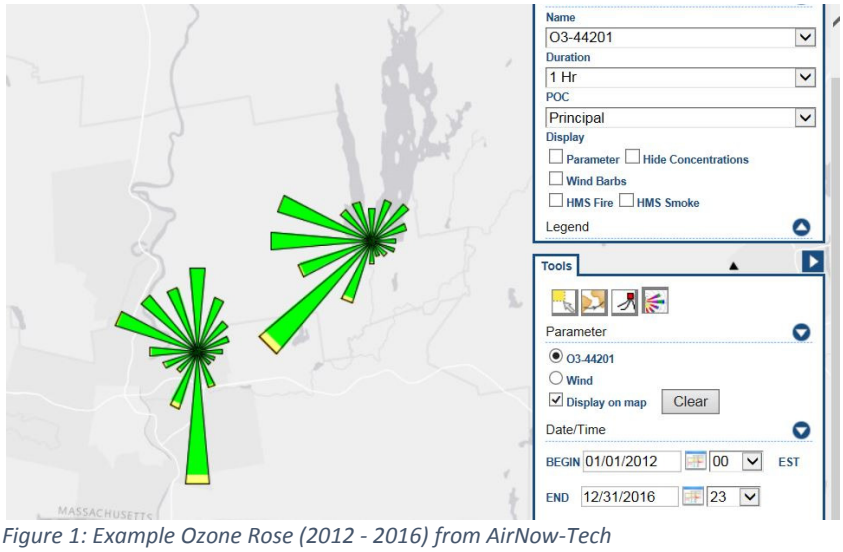


Figure 1: Example Ozone Rose (2012 - 2016) from AirNow-Tech

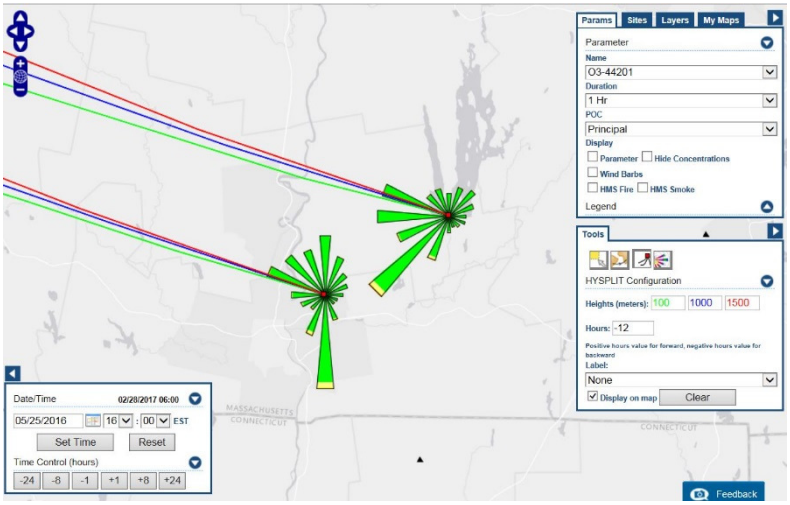


Figure 2: Same Ozone Rose as Figure 1 with back trajectories from May 25

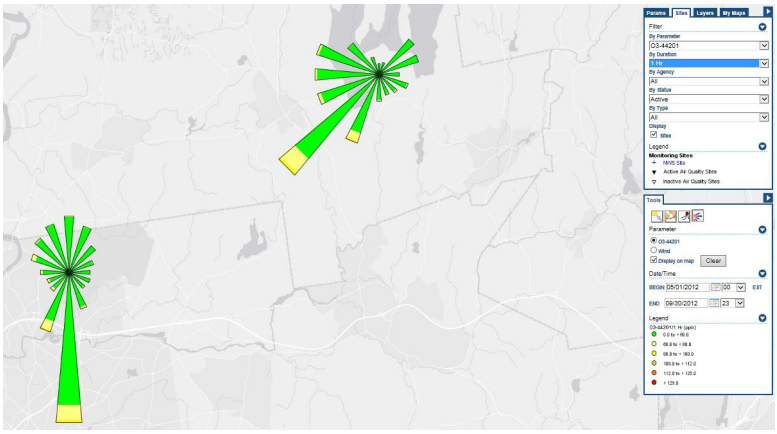


Figure 3: Ozone Rose May 1 - Sept 30, 2012

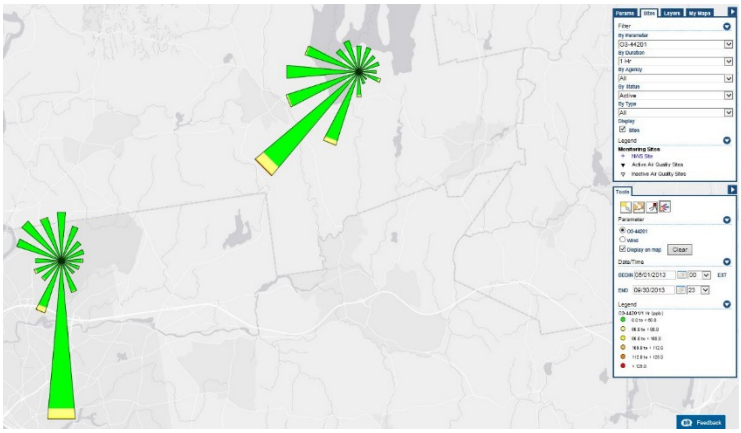


Figure 4: Ozone Rose May 1 - Sept 30, 2013

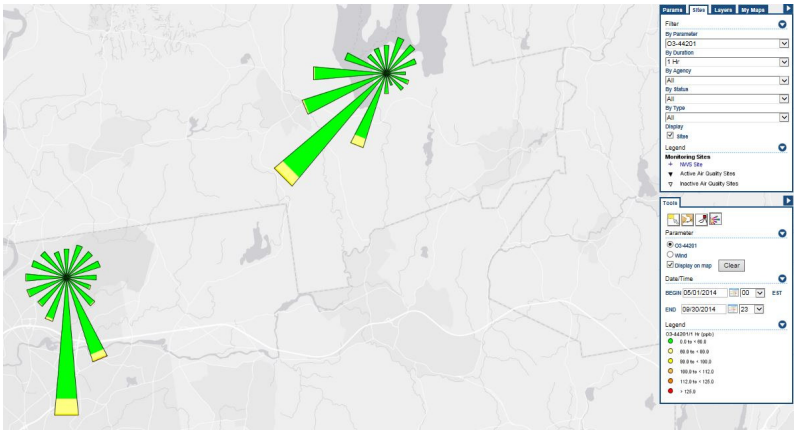


Figure 5: Ozone Rose May 1 - Sept 30, 2014

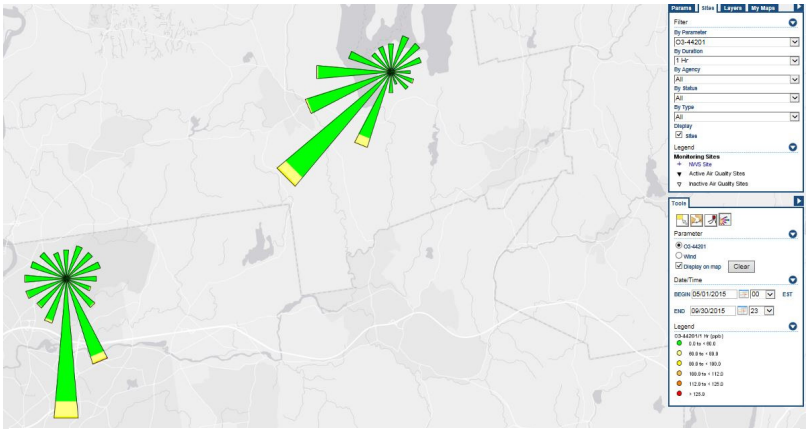


Figure 6: Ozone Rose May 1 - Sept 30, 2015

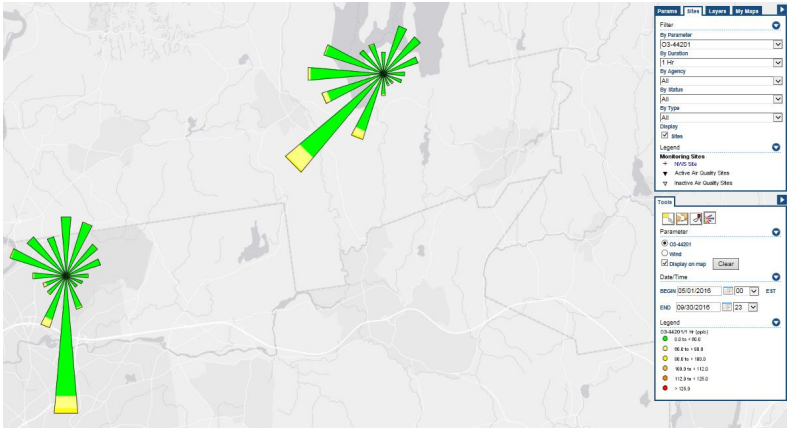
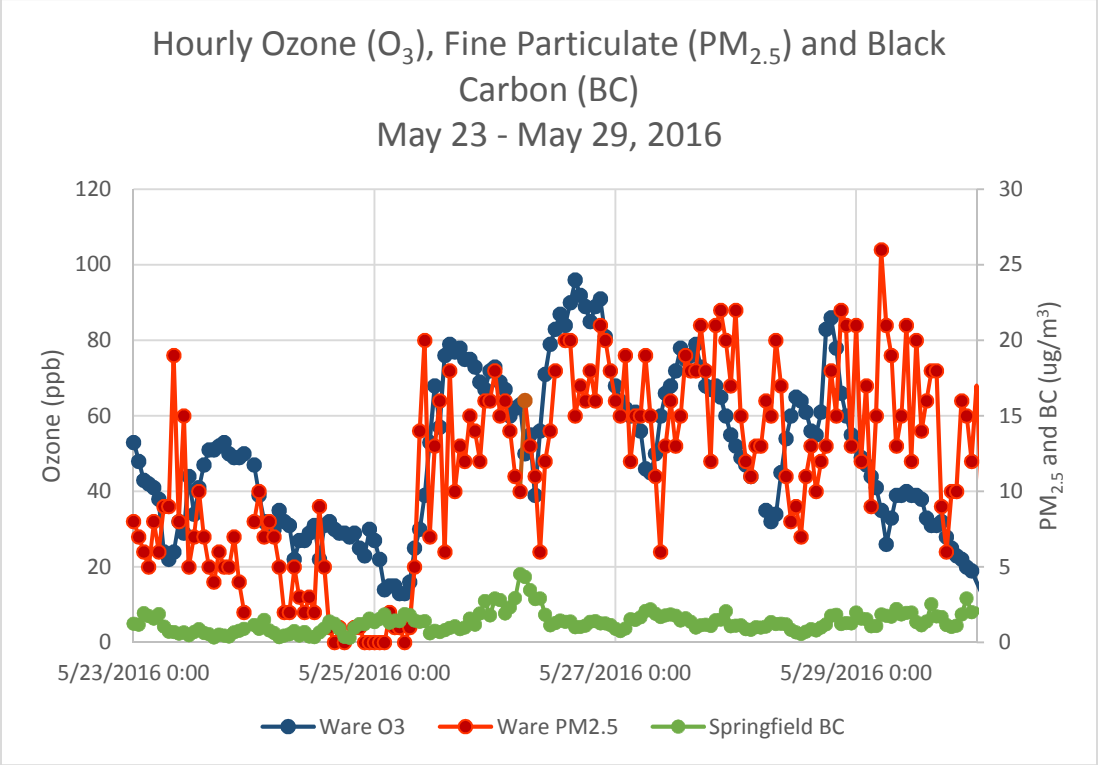
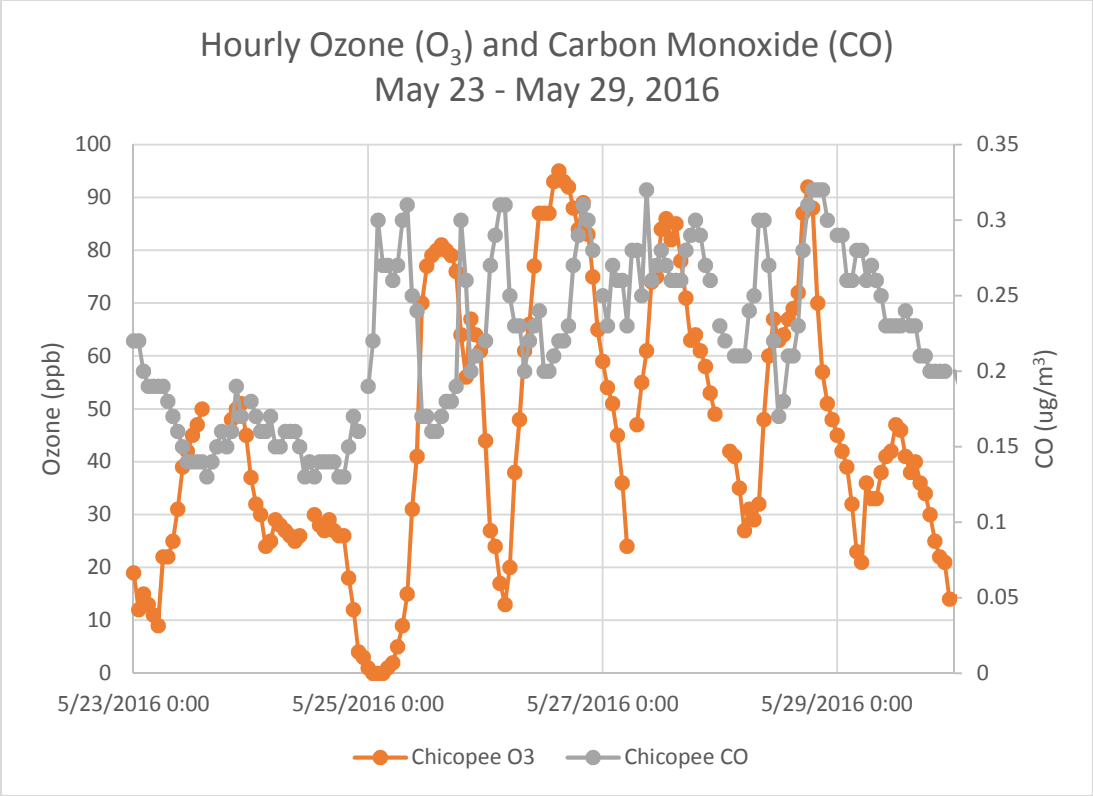


Figure 7: Ozone Rose May 1 - Sept 30, 2016

13. Page 31-33 (Figures 17-19). MassDEP should provide hourly concentrations of O_3, CO, continuous $PM_{2.5}$, BC and other related ambient air measurements such as delta C (calculated from aethalometers) for the period beginning May 23rd and ending May 29th. While all these measurements are not available at Chicopee or Ware, we believe including this information from nearby Springfield or even Greenfield may provide useful information. Additional information such as Chemical Speciation Network (CSN) data from Chicopee, or upwind areas may also be beneficial. MassDEP could also provide plots of O_3, CO, $PM_{2.5}$, and BC (and delta C) for non-event days to assist with comparisons in Section 10, beginning on page 38.

See the examples below of data analysis that may be useful.





14. Page 33, section 9. The second paragraph suggests that these back trajectories were done for ***500***m, 1000m and 1500m. Figures 20-33 (figure 29 is missing) all seem to indicate that the trajectories were done at ***100*** meters, 1000 meters and 1500 meters. Please correct that narrative. The graphics should be expanded as much as possible to make them as legible as possible. In addition, we believe that the spaces between "dots" on the back trajectory represent 6 hours of time. MassDEP would serve the public well by better explaining exactly what this graphic means to the lay person, including the different elevation trajectories, and the concept that longer "spaces" between "dots" implies faster wind speeds and other relevant material.

15. MassDEP should consider providing an analysis of daily NOx emissions from upwind electric generating units during the 2016 ozone season. This data is available from EPA's Air Markets Program Data (AMPD) website and will likely show that the May 25-26 time period was not a period of peak electricity demand in the Northeast with associated higher NOx emissions. Alternatively, MassDEP can point to the analysis of NOx sources already completed by the Connecticut Department of Energy and Environmental Protection (CT DEEP) and include this analysis as an appendix.

16. Regarding the public notice, EPA has no comments on the language of the notice but we do recommend broad distribution of the notice to the lists routinely used by MassDEP for notification of air quality regulations, permits, and air monitoring network plans.